Natural Gas
Pipeline / LDC Rates
Gas Industry Structure

- Producers
- Pipelines
- Distributors
- Customers
- Marketers/Brokers

Upstream

Downstream
U.S. NATURAL GAS CONSUMPTION (MMCF) BY MONTH (2001-2014 AVERAGE)

- January: Winter peak
- March: Shoulder seasons
- August: Summer peak
Note: MMCF/d= million cubic feet per day. Areas shown are not proportional to capacity volumes indicated. Other natural gas transmission pipelines may interconnect with and supplement the supplies of the mainline transmission or local distribution company in the market area to meet peak period demands.

Source: Energy Information Administration, Office of Oil and Gas
Gas Storage

Diagrammatic cross section of an aquifer storage reservoir:
2. Impermeable cap rock.
3. Upper control aquifer.
4. Gas.
5. Water.
7. Operating well.
8. Upper aquifer observation well.
9. Peripheral observation well.
10. Water level monitoring well.
12. Neutron logging well.
13. Closure.

Line Pack

- Refers to the volume of gas that can be stored in a pipeline
- Gas can be compressed
- Pressure in pipeline increases
- Volume of gas stored depends on pressure rating of the pipe, flanges, valves, compressors, etc.
- Can be used to balance system
Burner Tip Price ($/MMBtu)

Wellhead Price + Pipeline Charge + LDC Charge = Burner Tip Price
Delivery Rates

Regulated Utility Tariff Rates

Transmission (Pipeline Charge) → FERC

Distribution (LDC Charge) → State/Local
LDC Rate Case

• Utility files proposed rates and supporting evidence
• Other parties challenge and offer alternatives
• Commission makes decision
Main LDC Rate Case Issues

• **Class Cost of Service**
  – Volumetric vs. demand allocation
  – Storage

• **Revenue Allocation**
  – Spread of utility revenue requirement among rate classes
Main LDC Rate Case Issues

• Customer Balancing
  – Tolerance band
  – Cash-out pricing for transportation customer imbalances (market price vs utility cost of gas)
Purpose of a Cost-of-Service Study

To measure the responsibility of each class for the service provided by the utility
Typical Rate Classes in a Cost-of-Service Study

- Residential
- General Service
- Large Volume Service
- Interruptible
- Transportation
Cost Study Should Reflect:

• Many different types of cost
• Some customers do not use all of the services provided by an LDC
• Usage patterns affect cost incurrence
Procedure

1) Identify different types of cost
2) Determine causative basis for each type
3) Allocate each item among classes
Functionalization

**COSTS**
Return, Non-Gas O&M Expenses, Depreciation, Taxes

- Production
- Storage
- Distribution
Classification

Determine the primary causative factor for each type of cost
Classification Categories

- Direct assignment
- Number of customers
- Commodity (Mcf or therm usage)
- Demand requirements (Maximum rate of usage – Mcf per day)
- Revenue related
### Classification of Plant

<table>
<thead>
<tr>
<th></th>
<th>Customer</th>
<th>Demand</th>
<th>Commodity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Production</strong></td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td><strong>Storage</strong></td>
<td></td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td><strong>Distribution</strong></td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td><strong>General</strong></td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
</tbody>
</table>
## Classification of Expense

### Categories
- Production
- Storage
- Distribution
- Customer Acct.
- Admin. & Gen.

<table>
<thead>
<tr>
<th></th>
<th>Customer</th>
<th>Demand</th>
<th>Commodity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Storage</td>
<td></td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Distribution</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Customer Acct.</td>
<td>✔️</td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td>Admin. &amp; Gen.</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
</tbody>
</table>
Methods of Allocation

- Cost causation
- “Benefits”
- Social / Political Policy
- End results
Demand Allocation Methods

General Criteria

• Cost causation

• Recognize utility’s load characteristics

• Choice of method can be controversial
  • Design Day Demand vs. Average & Peak

• Distribution mains are typically largest plant investment for a LDC
Demand Allocation Methods

• Coincident Peak (Design Day Demand)
• Non-Coincident Peak Demand
• Average Demand
• Average and Excess
• Average and Peak
# Coincident Peak (Design Day Demand) Allocation Method

<table>
<thead>
<tr>
<th></th>
<th>Mcf</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>53,830</td>
<td>58.90%</td>
</tr>
<tr>
<td>General Serv.</td>
<td>30,800</td>
<td>33.70%</td>
</tr>
<tr>
<td>Interruptible</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Transportation</td>
<td>6,765</td>
<td>7.40%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>91,395</td>
<td>100.00%</td>
</tr>
</tbody>
</table>
## Non-Coincident Peak Demand

(Maximum Demand)

<table>
<thead>
<tr>
<th>Category</th>
<th>Mcf</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>60,233</td>
<td>54.90%</td>
</tr>
<tr>
<td>General Serv.</td>
<td>35,146</td>
<td>32.05%</td>
</tr>
<tr>
<td>Interruptible</td>
<td>7,136</td>
<td>6.50%</td>
</tr>
<tr>
<td>Transportation</td>
<td>7,159</td>
<td>6.55%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>109,674</td>
<td>100.00%</td>
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</table>
## Average Demand or Commodity Allocation Factors

<table>
<thead>
<tr>
<th>Type</th>
<th>Annual Mcf Throughput</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>4,015,479</td>
<td>32.5%</td>
</tr>
<tr>
<td>General Serv.</td>
<td>3,635,714</td>
<td>29.5%</td>
</tr>
<tr>
<td>Interruptible</td>
<td>2,577,034</td>
<td>20.9%</td>
</tr>
<tr>
<td>Transportation</td>
<td>2,114,666</td>
<td>17.1%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>12,342,893</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>
## Average Demand or Commodity Allocation Factors

<table>
<thead>
<tr>
<th></th>
<th>Ave. Dem. (Mcf/Day)</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>11,001</td>
<td>32.5%</td>
</tr>
<tr>
<td>General Serv.</td>
<td>9,961</td>
<td>29.5%</td>
</tr>
<tr>
<td>Interruptible</td>
<td>7,060</td>
<td>20.9%</td>
</tr>
<tr>
<td>Transportation</td>
<td>5,794</td>
<td>17.1%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>33,816</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>
Average & Excess Method

System Peak

Excess Demand

Average Demand

Class Peak

Excess Demand

Average Demand
## Average & Excess Method

<table>
<thead>
<tr>
<th></th>
<th>Average Demand</th>
<th>Maximum Demand</th>
<th>Excess Demand</th>
<th>Ex. Dem. %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Res</td>
<td>11,001</td>
<td>60,233</td>
<td>49,232</td>
<td>64.9%</td>
</tr>
<tr>
<td>GS</td>
<td>9,961</td>
<td>35,146</td>
<td>25,185</td>
<td>33.2%</td>
</tr>
<tr>
<td>IS</td>
<td>7,060</td>
<td>7,136</td>
<td>76</td>
<td>0.1%</td>
</tr>
<tr>
<td>Transp.</td>
<td>5,794</td>
<td>7,159</td>
<td>1,365</td>
<td>1.8%</td>
</tr>
</tbody>
</table>

Excess Demand = Maximum Demand – Average Demand
### Average & Excess Method

<table>
<thead>
<tr>
<th></th>
<th>Average Demand %</th>
<th>LF</th>
<th>Excess Demand %</th>
<th>1 - LF</th>
<th>AED %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Res</td>
<td>32.5%</td>
<td>37%</td>
<td>64.9%</td>
<td>63%</td>
<td>52.9%</td>
</tr>
<tr>
<td>GS</td>
<td>29.5%</td>
<td>37%</td>
<td>33.2%</td>
<td>63%</td>
<td>31.8%</td>
</tr>
<tr>
<td>IS</td>
<td>20.9%</td>
<td>37%</td>
<td>0.1%</td>
<td>63%</td>
<td>7.8%</td>
</tr>
<tr>
<td>Transp.</td>
<td>17.1%</td>
<td>37%</td>
<td>1.8%</td>
<td>63%</td>
<td>7.5%</td>
</tr>
</tbody>
</table>
Load Factor

- Average Demand / Peak Demand
- Measures how efficiently a class uses peak day capacity
- For the example, Load Factor equals: 33,816 Mcf / 91,395 Mcf, or 37%
Average & Peak Method

Average Demand

Peak Demand

Excess Demand

Double Counted
### Average & Peak Method

<table>
<thead>
<tr>
<th></th>
<th>Average Demand %</th>
<th>LF</th>
<th>Peak Demand %</th>
<th>1 - LF</th>
<th>AEP %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Res</td>
<td>32.5%</td>
<td>37%</td>
<td>58.9%</td>
<td>63%</td>
<td>49.2%</td>
</tr>
<tr>
<td>GS</td>
<td>29.5%</td>
<td>37%</td>
<td>33.7%</td>
<td>63%</td>
<td>32.1%</td>
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<tr>
<td>IS</td>
<td>20.9%</td>
<td>37%</td>
<td>0.0%</td>
<td>63%</td>
<td>7.7%</td>
</tr>
<tr>
<td>Transp.</td>
<td>17.1%</td>
<td>37%</td>
<td>7.4%</td>
<td>63%</td>
<td>11.0%</td>
</tr>
</tbody>
</table>
Cost-of-Service Study

Comparison of Allocation Factors

Customer

Demand

Throughput

Transp.

GS

Res

Transp.

GS

Res

Transp.

GS

Res
Cost-of-Service Study

Comparison of Allocation Factors

Transportation Class

- Non-Coincident Peak 6.6%
- Coincident Peak 7.4%
- Average & Excess 7.5%
- Average & Peak 11.0%
- Average Demand 17.1%
## Coincident Peak vs. Average and Peak

### Distribution Mains Acct. 376 Net Plant - $1,000,000,000

#### Average & Peak Allocation

<table>
<thead>
<tr>
<th>Rate Schedule</th>
<th>Amount</th>
<th>Peak Day CCF</th>
<th>Annual Volume CCF</th>
<th>Load Factor</th>
<th>Net Plant $/CCF Peak Day</th>
<th>Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>$502,789,056</td>
<td>10,000,000</td>
<td>1,100,000,000</td>
<td>30.1%</td>
<td>$50.28</td>
<td>0.96</td>
</tr>
<tr>
<td>Commercial</td>
<td>$370,697,833</td>
<td>7,000,000</td>
<td>900,000,000</td>
<td>35.2%</td>
<td>52.96</td>
<td>1.01</td>
</tr>
<tr>
<td>Transportation</td>
<td>$126,513,110</td>
<td>2,000,000</td>
<td>400,000,000</td>
<td>54.8%</td>
<td>63.26</td>
<td>1.20</td>
</tr>
<tr>
<td>Total</td>
<td>$1,000,000,000</td>
<td>19,000,000</td>
<td>2,400,000,000</td>
<td>34.6%</td>
<td>$52.63</td>
<td>1.00</td>
</tr>
</tbody>
</table>

#### Coincident Peak Allocation

<table>
<thead>
<tr>
<th>Rate Schedule</th>
<th>Amount</th>
<th>Peak Day CCF</th>
<th>Annual Volume CCF</th>
<th>Load Factor</th>
<th>Net Plant $/CCF Peak Day</th>
<th>Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>$526,315,789</td>
<td>10,000,000</td>
<td>1,100,000,000</td>
<td>30.1%</td>
<td>$52.63</td>
<td>1.00</td>
</tr>
<tr>
<td>Commercial</td>
<td>$368,421,053</td>
<td>7,000,000</td>
<td>900,000,000</td>
<td>35.2%</td>
<td>52.63</td>
<td>1.00</td>
</tr>
<tr>
<td>Transportation</td>
<td>$105,263,158</td>
<td>2,000,000</td>
<td>400,000,000</td>
<td>54.8%</td>
<td>52.63</td>
<td>1.00</td>
</tr>
<tr>
<td>Total</td>
<td>$1,000,000,000</td>
<td>19,000,000</td>
<td>2,400,000,000</td>
<td>34.6%</td>
<td>$52.63</td>
<td>1.00</td>
</tr>
</tbody>
</table>
Customer Classification of Distribution Mains

Total Demand = 1,000 Mcf
Minimum Distribution Method for Deriving Customer Related Component of Distribution Main

1) Diameter of smallest main 1.5”
2) Cost/foot of 1.5” main $0.61 / ft.
3) Total length of mains 6,385,860 ft.
4) Cost if all mains were 1.5” diameter $3,988,733
5) Actual cost of mains $19,326,453
6) Customer portion (4) / (5) 20%
Potential Advantages of Bypass

• Lower price
• Deal directly with pipeline
• Decrease state regulation
• Choice of service
• Sometimes alternate pipeline supplier
Potential Disadvantages of Bypass

- Only one pipeline supplier
- No LDC backup or storage service
- LDC may have excess capacity
- LDC services eliminated
Bypass can often be prevented by cost-based rates
QUESTIONS?